REMARKS

Reconsideration of the Office Action of October 10, 2006 is respectfully requested.

Claims 1-12, 26, 29 were pending in this application and have been rejected in the Office Action. Claims 13-24, 28 and 30 were withdrawn from consideration.

To summarize the claim changes made in this Amendment, claims 1-4, 9-12, 25, 29 and 29 have been amended and new claims 31-33 have been added.

New claims 31 to 33 are supported, for example, on pages 43 to 51.

No new matter is considered to be introduced by these amendments.

Claim Objections

Claim 1 was objected to because of a minor informality. This informality has been addressed by way of an amendment of claim 1.

Claim Rejections - 35 U.S.C. §112

Claim 1 was rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regards as the invention.

The Examiner recites it is not clear what all is meant and encompassed by the terms "feed forward" and "feedback" in the claims.

In this response, Applicants have replaced the language deemed problematic by the Examiner with alternate language finding clear support in the disclosure of the present application (e.g., see the disclosure appearing on pages 43 to 51 of the present application).

Claim Rejection - 35 U.S.C. §103

Claim 1 was rejected under 35 U.S.C. §103(a) as being unpatentable over Rodrigues et al (US 6,047,231) in view of Ozaki et al (US 2002/0005077).

Applicants respectfully submit that Rodrigues in view of Ozaki fails to disclose or suggest the claimed arrangement of the present invention.

Examiner's Rejection

Regarding claim 1, the Examiner recites:

Rodrigues discloses:

a1) a differential limiting control apparatus, and

a2) a tire diameter difference computing unit.

Ozaki teaches of:

a3) a feedback control unit for computing the feedback-control-based clutch torque (currently claimed as a first control unit for computing a first clutch torque in amended claim 1);

a4) a feed forward unit for computing the throttle-opening-based clutch torque (currently claimed as a second control unit for computing a second clutch torque in amended claim 1);

a5) a clutch torque computing unit for computing a final clutch torque based on the feedback-based clutch torque and the feed-forward-based clutch torque (currently claimed as a final clutch torque computing unit for computing a final clutch torque in amended claim 1);

a6) the clutch torque computing unit computes the final clutch torque by changing a ratio of the feedback-based clutch torque and the feed-forward-based clutch torque (the first and second clutch torque in amended claim 1); and

a7) the ratio is set variably according to the degree of the diameter difference of the tire.

Regarding claim 2, the Examiner recites:

Rodrigues discloses:

a8) a clutch torque computing unit for computing an engagement force based on a deviation between the target differential speed and the actual differential speed with a switching function by using at least a polarity related to an integral term of the deviation and by applying a sliding mode control (a first clutch torque computing unit for computing the first clutch torque in amended claims 1 and 2).

Rodrigues et al.

Rodrigues discloses a transfer case 130 having an electrically controlled clutch 135 for transferring motive power from an engine to a front drive shaft 132 and the rear drive shaft 133.

As set out in the disclosure, when a spare tire (or a smaller diameter tire) is detected, the controller modifies the clutch operating parameter as follows. See column 7, line 56 – column 8, line 16.

> *Thus, in a preferred embodiment as illustrated above, the values for the rear slip are increased by 1.5 KPH, the clutch increment rate is increased and the threshold at which the autolock is commanded is lowered from approximately 60% to approximately 42% of clutch duty cycle. Furthermore, in the state 7 before the routing to sense a spare tire is run, the initial values of the rear slip table are increased by a Spare_Tire_Sense_Slip_Offset of 0.5 KPH.*

According to the disclosure of Rodrigues, this reference describes:

b1) a torque distribution device having a clutch;

b2) sensing a smaller tire;

b3) controlling the clutch by feedback;

b4) two controlling logics of the clutch; and

b3) switching control logics of the clutch according to presence of the smaller tire.

Shown above, Rodrigues sets the clutch operating parameter in a single uniform way regardless of variation of the actual effective diameter of the spare tire or the smaller tire. There is no disclosure or suggestion to utilize the degree of the effective diameter difference of the small tire. Thus, both a slight smaller tire and a drastically smaller tire are handled in the same manner, mentioned above, once they are recognized as a spare tire.

Ozaki et al.

Ozaki discloses control of the assist clutch 25, which reduces the gear shifting time as the acceleration pedal depress stroke becomes larger (See Fig. 3, block 1012). In order to shorten the gear shifting time, the pressing force of the clutch plate of the assist clutch 25 is made larger than that in the case of ordinary gear shifting (paragraph [0069]).

8

Ozaki also discloses, in the synthesizing unit 105, the feedback command value for the assist clutch transmission torque supplied from the assist clutch transmission torque FB command setting unit 104 is <u>added</u> to the assist clutch transmission torque FF command value supplied from the assist clutch transmission torque FF command setting unit 102. An assist clutch command value for controlling the assist clutch 25 is generated thus, and supplied to the assist clutch drive device 28 (paragraph [0064]).

Thus, Ozaki simply adds the assist clutch transmission torque "FB" and the assist clutch transmission torque "FF" and obtains the final assist clutch torque to be applied to the assist clutch 25. It is clearly understood that Ozaki fails to teach or suggest changing the ratio of the FF and FB variably according to a foreign element, such as the degree of the effective diameter deficiency of the small tire. Accordingly, since Ozaki has no disclosure or suggestion about the spare tire presence, it fails to remedy the above noted deficiencies in Rodrigues.

Accordingly, Ozaki discloses:

c1) controlling a clutch by a feedback method;

c2) controlling the clutch according to a acceleration pedal amount; and

c3) the clutch controlling method which simply adds the clutch transmission torques derived from c1) and c2).

Applicants' invention

Applicants claimed invention features the final clutch torque is set variably between the first clutch torque (the feedback-based clutch torque) and second clutch torque (the feed-forward-based clutch torque that is preferably accelerator based) in accordance with the degree of the diameter difference of the tire. The benefits of this inventive arrangement is set out on, for example, page 50, line 15 – page 51, line 13 of the present application.

Claim 1 currently includes the feature of utilizing the degree of the effective diameter difference of the small tire as seen from the last paragraph of claim 1.

Moreover, the applied reference further fails to disclose or suggest an arrangement wherein the ratio of the first clutch torque (the feedback-based clutch torque) is increased and the ratio of the second clutch torque (the feed-forward-based clutch torque) is decreased as

9

the tire diameter difference becomes larger. See, for example, present claims 3, 31 and 32.

Comparing feature a7) of the claimed invention and b3) in Rodrigues, it is clearly understood that Rodrigues uses only the presence of the small tire and lacks a teaching as to how to utilize a degree of the tire diameter difference of the small tire.

Comparing feature a6) of the claimed invention and c3) in Ozaki, it is clearly understood that Ozaki lacks a teaching as to variably changing the ratio of clutch torque values c1) and c2). Applicants respectfully submit that there is lacking any form of a teaching or a suggestion in either of Rodrigues and Ozaki of these claimed features. Thus, Applicants respectfully submit that Rodrigues, as modified by Ozaki, fails to teach or suggest the feature a6) and a7).

Applicants respectfully submit that independent claim 1 and dependent claims are patentable and that the application as a whole stands in condition for allowance.

Also, if any fees are due in connection with the filing of this amendment, such as fees under 37 C.F.R. §§1.16 or 1.17, please charge the fees to Deposit Account 02-4300; Order No. 032405R156.

Respectfully submitted,

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